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Nanoparticle synergies in modifying thermal conductivity for heat exchanger in condensing boilers[1] KAI YANG, SHAN HE, Stony Brook University, THOMAS BUTCHER, REBECCA TROJANOWSKI, Brookhaven National Laboratory, NING SUN, DILIP GERSAPPE, MIRIAM RAFAILOVICH, Stony Brook University — The heat exchanger we are using for condensing boilers is mainly made from aluminum alloys and stainless steel. However, the metal is relatively expensive and corrosion together with maintenance is also a big problem. Therefore, we have developed a new design and material which contain carbon black, carbon nanotube, aluminum oxide and graphene as additives in polypropylene. When multiple types of particles can be melt blended simultaneously and synergies can be achieved, imparting particles to the nanocomposite, achieved much higher thermal conductivity rather than single additive. Here we show the flame retardant nanocomposite which can pass the UL-94-V0 vertical burning test, perform nice in Cone Calorimetry Test and has relatively good mechanical properties. SEM images of the blend show that the Carbon nanobute and other additives well dispersed within the polymer matrix which match our computational calculation for getting the percolation to achieve thermal conductivity around 1.5W/m·K rather than 0.23W/m·K as pure polypropylene.

[1]Haydale/Cheap Tubes

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